Lehman Brothers Holdings Inc. v. Tobacco Settlement Authority of Washington State
Rebuttal Report by Peter Shapiro
March 24, 2014

1. The key issue in this case is how to determine the fair market value for a highly illiquid, complex financial contract (the Tobacco Settlement Authority Reserve Fund Agreement or "RFA" or "TSA RFA"). Because there was no market for the RFA on the termination date (and there continues to be no market today), the task of valuation is unusually difficult.

2. There is no dispute about certain key facts: (a) On the termination date, there was no way to value the RFA based on willing-buyer/willing-seller transactions for tobacco RFAs, as none existed on or anywhere near that date; and (b) TSA, like all other similarly situated tobacco securitization agencies that held reserve fund agreements on which Lehman had defaulted, had no acceptable alternative vehicle for its reserve fund (one that mirrored the limited risks in the TSA RFA), and has suffered millions of dollars of lost interest income which Lehman had guaranteed it (and faces continued losses of millions of dollars). The issue at hand is to determine the magnitude of the damages to TSA.

3. In the absence of a functioning market for tobacco RFAs, both sides to the dispute have discussed two alternative valuation methodologies.

4. The first methodology is "hypothetical replication". This is the methodology that was used by TSA to value its claim, and is the basis for my expert report. It is also the methodology that Lehman's expert Samuel Gruer has used. Under this methodology, an attempt is made to establish what the value of the RFA would be on a "what if" basis – i.e., under a what-if scenario assuming that a market did exist, where would reasonable financial institutions be willing to offer the product to a party in TSA's position, taking into account everything that was known about market conditions that may have been germane to the RFA at the time of termination.

5. The second methodology is "actual losses". This is the methodology that was used by TSA's expert Daniel Curry and Jeffrey Hasterok, and rebutted by Lehman's experts David Babbel and Samuel Gruer. It examines TSA's actual losses and projected future actual losses, assuming (as is not in dispute) that TSA is unable to replace the RFA and instead invests its funds in permitted instruments allowed by TSA's indenture with a risk profile no worse than the RFA. This method takes a straightforward approach to determining Loss by looking at the actual investment returns that TSA has been able to achieve in the absence of the RFA, and at what level those returns could reasonably be projected to be for the remaining future life of the contract. The inherent difficulty of this approach is the reasonable estimation of future investment (interest) rates.

6. I have examined both alternative approaches, after reviewing the reports and depositions of the experts. Below, I provide a detailed rebuttal to Gruer's report, as my valuation of the RFA was based on hypothetical replication. I should note, however, that I have also reviewed the actual losses

methodology, and believe that the determination made by Currry and Hasterok is sound, and is similar to an alternative methodology that I examined, as noted in my second deposition (Shapiro deposition, March 5, 2014, pp. 225-226).

7. Hypothetical replication, moves valuation from a market-based approach to a model-based approach. Models are at best imperfect approximations of the reality of markets. There are a plethora of cases where models have predicted a hypothetical outcome, but real markets produced drastically different actual results, often to the great peril of participants in financial markets. (See Nassim N. Taleb, "The Future Has Thicker Tails than the Past: Model Error as Branching Counterfactuals", presented at Yale University, April 29, 2011, available at www.fooledbyreandomness.com/errors.pdf.)

8. Model-based measurement requires a series of what-if assumptions to be made to estimate what inputs a hypothetical dealer would have included in pricing an RFA if a functioning market for the RFA had existed on the termination date. As both Gruer and I agree, all dealers would use a LIBOR swap (where the dealer pays fixed and TSA pays floating) as the starting point for pricing the RFA. A LIBOR swap, with size, amortization and other key attributes based on the requirements of the RFA, would be used to determine an initial "base" fixed rate. Both sides agree that from this base rate, the dealer would then adjust the fixed rate upward or downward for a variety of adjustments (or inputs) that reflect the special nature of an RFA transaction. These adjustments include: (1) profit margin; (2) credit adjustment; (3) cost or benefit associated with the ability to deliver the type or types of securities permitted under the RFA; and (4) other adjustments that the specifics of the contract or market conditions at the time of pricing may necessitate. The adjustments together are referred to in the market as the "spread", or sometimes as the "spread from mid-market", with the term "mid-market" being used to refer to the base LIBOR swap rate described above.

9. As Gruer points out (Gruer report, p. 17), the differences between my valuation and his valuation are almost entirely a function of these adjustments – i.e., of the spread that a dealer would have charged if a dealer existed on the termination date who would agree to replace Lehman in the RFA with TSA. Gruer's spread is based on best-case conditions of a smoothly functioning market where buyers and sellers are plentiful and can transact freely, where pricing varies little from one dealer to another, and where bid-offered spreads are narrow. This portrait is purely imaginary. Even prior to the financial crisis, the market for RFA's was very narrow, dominated by a few dealers, and pricing varied widely among dealers. In his deposition (41:6-9), Gruer says that RFA dealers would price a transaction within 5 to 10 basis points of each other . The facts show otherwise. As the bidding for TSA's RFA shows, dealer prices varied more than 95 basis points in 2002, when a fully functional market existed. In my professional experience, in the time period prior to the recent financial crisis, wide distributions in bidding on similar contracts were the rule, not the exception.

10. In 2009, there were multiple willing sellers like TSA seeking RFAs for tobacco reserve funds (largely seeking to replace RFAs that Lehman had defaulted on), but there were no willing buyers. Under

such conditions, a neutral party seeking to determine fair value surely could not proceed as Gruer has, pretending that the market was unimpaired.

11. A starting point for determining a reasonable spread is to examine the spread that Lehman itself included in its pricing of the RFA in 2002, under healthy market conditions. Konheim Exhibit 23 (LBHI WTSA 00005582) shows certain of Lehman spread calculations at inception. By subtracting the RFA's 4.484% fixed rate from Lehman's indicated swap rate of 5.55%, and backing out 0.025% cost of brokerage fee, Lehman's spread can be determined to be approximately 105 bps. As described below, in the non-functioning market at the time of termination in 2009, where no dealer would agree to enter into a tobacco RFA at any price, the hypothetical spread to be used in a model-based valuation would clearly need to be significantly higher. The higher the spread, the lower the interest rate the dealer would pay (and the larger TSA's loss would be).

12. SFG participates in the pricing of more than one hundred derivative transactions in the course of a typical year. Over the course of my firm's 16 years as a leading independent swap advisor, we have participated in the pricing of more than three thousand transactions with more than 20 top financial institutions. As my firm is a small boutique, I have personally participated in more than 75% of these pricings. These transactions include both traditional derivatives like swaps and caps, as well as transactions like RFAs, which banks hedge in the swap market and are generally priced by the same "desk", or group of traders, as other derivatives at each financial institution. At the time of pricing, the traders generally discuss with us the methodology they used to arrive at their bid or offer price or rate. They start with the mid-market level, for a base swap, and then they adjust that price or rate for four or more factors: (1) credit; (2) profit; (3) execution costs; and (4) other. I discuss each of these factors below, as they pertain to the TSA RFA.

13. **Credit**. The single most important issue on which Lehman's expert (Gruer) is mistaken is credit spread. Gruer's errors (and a similar set of errors that Lehman has incorporated into its initial valuation of the TSA RFA) are at the root of the largest part of the difference between the parties in this dispute. When a dealer enters into a transaction, he adjusts his price for the credit exposure he takes on to his counterparty. Gruer has argued that a hypothetical dealer would include an ordinary credit spread in order to enter into a replacement RFA. By Gruer's calculations, the credit spread should be only 16.9 bps. On its face, as well as on deeper consideration, this contention is not supportable.

14. First, it is clear that even at the inception of the RFA in 2002, Lehman charged more for credit. Konheim Exhibit 23 shows that Lehman's traders included a credit charge of $4,522,000 at the time they entered into the transaction. Expressed in basis points, this equates to a spread of 67 bps. (Each basis point is equal to $67,492, as shown in Lehman's calculations of the 2.5 bps fee it paid for brokerage, as per LBHI_WTSA_00002673.) Recall, of course, that this was 2002, when markets were functioning smoothly and efficiently. The notion that credit spread would have dropped from the good times of 2002 to the midst of the financial crisis in March 2009 defies common sense.

15. Second, a review of market history from 2002 shows a general widening of virtually all credit spreads across the market. This should not be surprising, as the financial crisis produced a whip-lash effect, going from a credit bubble in the early and middle parts of the decade to a credit bust beginning as the subprime mortgage meltdown emerged in 2006 and 2007. It shows up in virtually every market metric of the cost of credit. A few examples are illustrative. From the Nov. 5, 2002 inception date of the RFA to the Mar. 25, 2009 termination date, the credit default swap on the nation's largest bank, J.P. Morgan Chase, increased from 74.5 bps to 174.4 bps, an increase of 134% (Source: Bloomberg, page CJPM1U5). Looking major non-financial companies, the credit default swap on Procter & Gamble increased from 31.0 bps to 118.3 bps, an increase of 282% (Bloomberg CPG1U5). Looking at the municipal bond market, the spread between the industry benchmark Bond Buyer Revenue Bond Index and the 30-year US Treasury increased from 12.2 bps to 206.8 bps, an increase of 1595%. Even looking at the cost of borrowing by triple-A rated Harvard University, the increase in credit costs is clear. Harvard issued 35-year debt in July 2002 at a spread of negative 16.9 bps under the 30-year US Treasury (the lower yield is attributable to both Harvard's stellar triple-A credit and to the tax-exemption on its debt). In mid-December 2008, Harvard issued 28-year debt, also tax-exempt, at a spread of 271.4 over the 30-year Treasury, a net increase in credit spread for the nation's oldest and richest university of 288.3 bps. The math is compelling. To assert that the credit spread for TSA's RFA would have remained the same or less than it was in 2002 is clearly inconsistent with the available market facts.

16. Third, in his deposition testimony, Gruer conceded (121:12-13) that market perception of TSA's creditworthiness had become significantly worse from 2002 to 2009. Within the context of a market where credit spreads had widened sharply on virtually all credits, including the highest rated entities, like Procter & Gamble and Harvard, whose ratings remained extremely strong throughout the financial crisis, it is totally unreasonable to assume that the credit spread on the TSA RFA would not have widened sharply.

17. Fourth, lack of any interest in trading tobacco RFAs demonstrates that the market perception of tobacco risk had gone off the charts. In my firm's direct conversations with every major dealer around the time of the TSA RFA termination, several dealers were willing to enter into RFAs (at fixed rate levels that would admittedly be unattractive to clients) for non-tobacco credits. But no dealer was interested in touching this deal, or any other similar tobacco RFA, at any price, even if the fixed rate they were offering to pay was zero. The total lack of interest speaks volumes about where a fair determination of a hypothetical credit spread should be for a valuation conducted as of March 2009. There were multiple "sellers" – tobacco authorities – but no buyers. As even the simplest knowledge of the law of supply and demand shows, if sellers overwhelm buyers, prices will drop sharply. In this case, the lack of dealers willing to enter into RFAs must be accounted for in the fixed rate that a hypothetic dealer would offer – if one existed. A hypothetical dealer would clearly need to impose a larger than normal credit spread to take on what the market perceived to be too risky a contract to offer. Or, put another way, the risks that resulted in the disappearance of an active market should be fully reflected in the credit spread.

18. Fifth, even in a normal market, Gruer's methodology for determining credit spread is fatally flawed. While Gruer and I start at the same point, which is the differential between high-quality bonds and tobacco-related bonds in the municipal market, Gruer reduces this differential severely by making a series of erroneous assumptions that rest on inaccurate and incomplete analysis of the RFA.

19. Gruer's principal argument is that the credit spread derived from the muni bond market would be excessive because it reflects the fact that a bondholder is exposed to risk of loss of principal, while the dealer providing the RFA is not. (Gruer report, p. 18.) I agree that this lack of exposure to principal risk is a "narrowing" factor that would act to narrow the credit spread in the RFA as compared to the bond credit spread. Gruer fails, however, to mention multiple countervailing factors that would act to widen the RFA credit spread as compared to the bond credit spread. I list these "widening" factors below.

20. First, the credit position of the dealer providing the RFA is deeply subordinated to that of the bondholder. The bondholder has the senior-most claim on all of TSA revenues in the event of a default. The RFA dealer is, by contrast, at the very bottom of the credit waterfall, and will only be paid when all other creditors have been satisfied first. In deposition, Gruer admits he failed to factor this into his calculations (186:5-11).

21. Second, as Gruer himself admits in his deposition (183:8-17), bondholders assume correctly that in the event of a default they are highly unlikely to suffer from a total loss. Instead, they assume a likely percentage of recovery if the issuer of the bonds goes into default. The key considerations in the credit spread on a bond are probability of default and expected recovery in the event of default. In a major study entitled "The U.S. Municipal Bond Rating Scale", dated March 2007, Moody's Investors Service concluded that municipal bonds (other than those issued for non-profit entities and project finance) have an expected rate of recovery of between 70% and 95%. Thus, assuming even the poorest end of this range, the expected loss for a bondholder in the event of default would be only 30%. Gruer admits (deposition, 181:17-20) that he used "standard recovery assumption" in the Bloomberg CVA model he used to estimate credit spread for the RFA. By contrast, the RFA dealer must assume he will suffer a 100% loss, as his claim will with certainty be wiped out in its entirety by payments to priority creditors. (In his deposition, Gruer conceded that he expects that actual recovery on default on the RFA would be zero. (183:13.) This fact alone gives the lie to Gruer's calculations that the RFA dealer's credit spread should be a fraction of the credit spread embedded in the bond yield for tobacco bonds. If the bondholder can reasonably expect a worst-case loss of only 30%, while the RFA dealer can expect a 100% loss, then the mathematics of calculating the RFA credit spread must be multiplied, not divided as Gruer contends.

22. Third, the dealer providing the RFA is in a far worse position than the bondholder, as he can be wiped out, even without a default. The dealer is providing a reserve fund agreement, which as it sounds, is on the reserve fund established as additional security on the bonds. If there is a credit problem, the reserve fund is invaded first to satisfy any claims or deficiencies. It is only after the reserve fund has been totally depleted that the bondholders face any prospect of default. Thus, it is

entirely possible that the RFA dealer will face a complete loss of value, while the bondholder will face none. This reality clearly acts to widen the credit spread a dealer would require on an RFA.

23. Fourth, the RFA dealer is exposed to a unique additional risk, which is referred to in the market as "replenishment risk". In the example cited above, the sequence of events is (a) a credit problem develops that requires the issuer to invade the reserve fund; (b) the reserve fund is depleted; and (c) the dealer loses all value in the RFA. There is a further step in the sequence that can also occur. If conditions improve, the TSA has the right to replenish the reserve fund with available revenues, should they become available. The RFA dealer would then be required to reinstate the RFA at the same fixed rate that had been provided previously. This provision of the RFA further magnifies credit risk, as the dealer who would likely have unwound his offsetting hedges when the reserve fund was invaded initially, will now have to go back out into the market, under conditions which may be highly disadvantageous, and reestablish hedges at an uncertain cost. Replenishment risk is thus another widening factor that Gruer and Lehman have failed to recognize.

24. Together, these widening factors can reasonably be assumed to offset fully the single narrowing factor (non-exposure to principal risk) that Gruer cites. Taken in totality with the utter illiquidity of the market at the time of termination, it is fully reasonable to assume that a hypothetical dealer would make use of the credit spread as used by TSA in our valuation, not the absurdly small credit spread that Gruer and Lehman have used.

25. **Profit**. Gruer accepts our estimate of a reasonable hypothetical profit component of spread at approximately 25 basis points. Clearly, we concur.

26. **Execution costs**. This component of spread covers the dealer's own cost of hedging and of the other burdens the dealer takes on it executing the deal. Hedging cost is attributable to the fact that the dealer must enter into offsetting hedges to protect itself from market risk. Depending on the type of hedges needed, the spread would vary from one to several basis points. For a hypothetical replacement of the TSA RFA, a dealer would need to enter into both a fixed-floating swap and a basis swap. The fixed-floating swap would hedge against changes in the overall level of interest rates for the structure of the RFA. The basis swap would be used to hedge the differential between LIBOR and the actual floating rate that the dealer would benefit from. This floating rate is the rate that the dealer would receive on the "cheapest to deliver" security – in this case, commercial paper. In the interdealer hedging market at the time of termination, I believe the cost of hedging the fixed-floating swap was roughly 0.5 bps. Bloomberg shows the same range, by comparing the "mid" vs. "ask" on the 30-year US Dollar LIBOR swap, found under Bloomberg symbol "USSW30 Currency". The hedging for the basis swap would be more costly. Bloomberg shows a cost of 10 bps, found by comparing "mid" vs. "ask" on the 30-year LIBOR-CP basis swap under Bloomberg symbol "USBD30 PREB Currency". The combined hedging cost spread would thus equal approximately 10.5 bps. Gruer fails to take into account any hedging cost in his analysis, producing an erroneously low spread.

27. An additional execution cost relates to the administrative burden placed on the dealer to make semi-annual deliveries of securities over the course of a contract over the remaining 23 years of its life. Actively buying commercial paper or other eligible securities is not without cost. Gruer ignores this cost, and treats the administrative cost to the dealer as no different than a vanilla swap. In my experience, banks vary in the cost that they imply for the added burden as compared to a cost, but it is not free. In my professional judgment, I would include a 2 bps cost.

28. Under the category of "other" are several other spread components. A key component here is the value that the dealer places on the eligible security he is permitted to deliver under the RFA. The TSA RFA permits delivery of three types of instruments maturing within 6 months of delivery: Treasurys, Agencys and highly-rated Commercial Paper ("CP"). As both I and Gruer agree, industry practice is to assume delivery of the highest yielding security, or in the parlance of the market, the "cheapest to deliver". In my professional experience, in reserve fund agreements (and other similar forward purchase agreements), CP has consistently been the security that dealers assumed on pricing, if it is permitted. For CP-eligible transactions, Agencys and Treasurys are considered to be back-ups to be used only in the event eligible CP is not available.

29. In my report, I have assumed the use of CP, and allowed for a positive spread (in Lehman's favor) of 66.6 bps, which Gruer states he "accepts" (Gruer report, p. 19). I have gone back and reviewed my original calculations and now believe that I overstated the value in Lehman's favor. The methodology that was used by my staff in determining the 66.6 bps did not take into account actual hedging conditions at the time of the termination. A review of available data shows the favorable spread for Lehman should be reduced significantly. For a dealer to hedge the risk of having to pay a CP rate rather than LIBOR for the remaining 23 years of the RFA, the dealer would make use of the market for basis swaps. The dealer would use a CP-LIBOR basis swap to protect himself from the risk that CP rates would vary adversely from LIBOR over the 23 year period. Bloomberg provides two screens that show CP-LIBOR basis swaps for nearby maturities, one for 20 years and one for 30 years (Bloomberg symbols USBD20 PREB Currency and USBD30 PREB Currency). For the termination date of March 25, 2009, the spreads shown are 2.63 bps and 4.25 bps, respectively. Thus, for a 23 year exposure, the approximate spread should be approximately 3.1 bps. Thus, the spread of 66.6 bps we originally used provided an unfair benefit of Lehman of approximately 63.5 bps. Based on this reconsideration, I believe that the Loss calculation provided by TSA – based on earlier work by my firm – is somewhat understated.

30. Gruer makes an unsupportable claim that a dealer on the termination date – if such a dealer had existed – would have valued the RFA based on using Agencys as a deliverable. He then constructs a convoluted argument in an attempt to show that Agencys would produce a greater benefit to Lehman. I believe this argument is completely specious, as in my professional experience, I have never seen a dealer price an RFA or other similar agreement based on Agency deliverables, where the alternative of CP deliverables was available. Lehman's own internal documents support my belief. On page 9 of a document entitled "Municipal Derivatives: Business and Market Risk Overview" dated September 2008 (apparently immediately after Lehman's bankruptcy filing),

Lehman states that "There is no Agency/LIBOR basis swap market", and thus all of Lehman's forward purchase agreements (including RFAs) should be valued as either using Treasurys or CP.

31. Gruer's failure to take into account all of these spread components, and especially his gross understatement of the correct credit spread, tilt his calculations of the value of the RFA drastically lower than the fair value. His calculations severely shortchange TSA for Lehman's benefit. It is my conclusion, after careful consideration and analysis of the Gruer report and deposition, my opinion of the valuation remains the same. If anything, a fair and reasonable review would show that I may have understated in Lehman's favor the actual valuation of the TSA RFA.